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#19 Appeal Brief
Snw 10/14/03

Docket No.: 614.1921

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Tadao NAKAZAWA, et al.

Serial No. 09/248,103 Group Art Unit: 2633

Confirmation No. 8397

Filed: February 11, 1999 Examiner: A. Bello

For: ACOUSTO-OPTICAL TUNABLE FILTERS CASCADED TOGETHER

APPEAL BRIEF

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

This Appeal Brief is in response to the Final Office Action mailed May 7, 2003, and the Advisory Action mailed August 11, 2003.

A Notice of Appeal was filed September 8, 2003.

1. REAL PARTY IN INTEREST

The real party in interested in Fujitsu Limited. An Assignment to Fujitsu Limited was filed on May 3, 1999.

2. RELATED APPEALS AND INTERFERENCES

There are no related appeals and interferences.

3. STATUS OF CLAIMS

Claims 1-89 are currently pending. All these claims are rejected, and are appealed.

A. Claims 1-15, 18-22, 25-32, 35-59, 62-68 and 71-89 are rejected under 35 USC 103 as being unpatentable over Guadino's article "A Novel AOTF-Based Multichannel Add-Drop Node and its Cascadability in WDM Ring Networks" in view of Thompson (US Patent No. 6,031,852)

B. Claims 16, 17, 23, 24, 33, 34, 60, 61, 69 and 70 are rejected under 35 USC 103 as being unpatentable over Guadino's article "A Novel AOTF-Based Multichannel Add-Drop Node and its Cascadability in WDM Ring Networks" in view of Thompson (US Patent No. 6,031,852) and Cheung (US Patent No. 4,906,064)

4. STATUS OF AMENDMENTS

A Response After Final was filed on July 14, 2003. The Response After Final was entered.

There are no unentered amendments after the Final Office Action.

5. SUMMARY OF THE INVENTION

Various embodiments of the present invention relate to first and second acousto-optical tunable filters (AOTFs) cascaded together so that the second AOTF filters light output from the first AOTF. The first and second AOTFs have filtering characteristics controlled in accordance RF signals applied thereto. In various embodiments of the present invention, a phase of a beat generated by the RF signals applied to the first AOTF is different than a phase of a beat generated by the RF signals applied to the second AOTF. See, for example, FIGS. 14 and 16

and the disclosure on page 17, line 13, through page 19, line 8; page 20, lines 4-13; page 31, lines 12-27, of the specification.

Various embodiments of the present invention relate to configurations of first, second and third AOTFs, where the phase of the beats are controlled. See, for example, FIG. 14. More specifically, FIG. 14 shows a configuration of a first AOTF1, a second AOTF2 and a third AOTF3.

Various embodiments of the present invention relate to configurations of first, second, third, fourth and fifth AOTFs, where the phase of the beats are controlled. See, for example, FIG. 33. More specifically, FIG. 33 shows a configuration of a first AOTF, a second AOTF2, a third AOTF3, a fourth AOTF4 and a fifth AOTF5.

6. ISSUES

A. Are claims 1-15, 18-22, 25-32, 35-59, 62-68 and 71-89 patentable under 35 USC 103 over Guadino's article "A Novel AOTF-Based Multichannel Add-Drop Node and its Cascadability in WDM Ring Networks" in view of Thompson (US Patent No. 6,031,852)?

B. Are claims 16, 17, 23, 24, 33, 34, 60, 61, 69 and 70 patentable under 35 USC 103 over Guadino's article "A Novel AOTF-Based Multichannel Add-Drop Node and its Cascadability in WDM Ring Networks" in view of Thompson (US Patent No. 6,031,852) and Cheung (US Patent No. 4,906,064)?

7. GROUPING OF CLAIMS

A. Claims 1, 3, 4, 6, 7, 8, 9, 35, 36, 38, 39, 40, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 78, 79, 80, 86, 87, 88, 89 are grouped together since these claims recite features relating to first and second optical filters or AOTFs, and different phases.

B. Claims 2, 5, 37 and 41 are grouped together since these claims recite features relating to first and second optical filters or AOTFs, and a difference in phase is obtained by dividing 180° by the number of stages.

C. Claims 25, 71, 74, 75, 76 and 77 are grouped together since these claims recite features relating to first, second and third optical filters, and phases controlled with respect to

each other.

D. Claims 10, 12, 13, 14, 15, 18, 19, 20, 21, 22, 26, 28, 29, 30, 53, 55, 56, 57, 58, 59, 62, 64, 65, 66, 67, 68 and 72 are grouped together since these claims recite features relating to first, second and third optical filters or AOTFs, and different phases.

E. Claims 11, 27, 54, 63 and 73 are grouped together since these claims recite features relating to first, second and third optical filters or AOTFs, where the "phase" for the first optical filter or AOTF is different than that for the second and third optical filters or AOTFs, and "phase" is equal for the second and third optical filters or AOTFs.

F. Claims 16, 17, 23, 24, 33, 34, 60, 61, 69 and 70 are grouped together since these claims recite features relating to first, second and third optical filters or AOTFs, and the substrate having a "reflecting device".

G. Claims 31, 32, 81, 84 are grouped together since these claims recite features relating to first, second, third, fourth and fifth optical filters or AOTFs, with phases controlled with respect to each other.

H. Claims 82 and 85 are grouped together since these claims recite features relating to first, second, third, fourth and fifth optical filters or AOTFs, where the phase for the first is different from the phase for the second, third, fourth and fifth.

I. Claim 83 is grouped by itself, since this claim recites first, second, third, fourth and fifth optical filters, where the phase for the first is different from the phase for the second, third, fourth and fifth; the phase for the second is equal to the phase for the third, and the phase for the fourth is equal to the phase for the fifth.

8. ARGUMENT

REJECTION OF CLAIMS 1-15, 18-22, 25-32, 35-59, 62-68 AND 71-89 UNDER 35 USC 103 AS BEING UNPATENTABLE OVER GAUDINO, "A NOVEL AOTF-BASED MULTICHANNEL ADD-DROP NODE AND ITS CASCADABILITY IN WDM RING NETWORKS" IN VIEW OF THOMPSON, U.S. PATENT NO. 6,031,852

The present invention as recited, for example, in claim 4, relates to an apparatus comprising first and second acousto-optical tunable filters (AOTF) cascaded together so that the second AOTF filters light output from the first AOTF. The first and second AOTFs have filtering characteristics controlled in accordance with RF signals applied thereto. A phase of a beat generated by the RF signals applied to the first AOTF is different than a phase of a beat generated by the RF signals applied to the second AOTF. See, for example, FIGS. 14 and 16 and the disclosure on page 17, line 13, through page 19, line 8; page 20, lines 4-13; page 31, lines 12-27, of the specification.

As indicated above, claims 1, 3, 4, 6, 7, 8, 9, 35, 36, 38, 39, 40, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 78, 79, 80, 86, 87, 88, 89 are grouped together since these claims recite features relating to first and second optical filters or AOTFs, and different phases.

Guadino discloses AOTFs cascaded together in a node architecture for adding/dropping wavelengths of a wavelength division multiplexed (WDM) light.

However, as recognized by the Examiner in the Final Office Action, Gaudino fails to specifically teach that the phase of a beat generated by the RF signals applied to the first optical filter is different than a phase of a beat generated by the RF signals applied to the second optical filter.

Therefore, the Examiner combines Gaudino with Thompson to reject the claimed invention.

Thompson relates to the use of acoustooptic devices *in a laser or other optical resonator to produce wavelength-dependent deflection*. See, for example, the Abstract; FIG. 1, and column 5, line 61, through column 6, line 38, of Thompson. It is respectfully submitted that the use of an acoustooptic device in a laser or other optical resonator to produce wavelength-dependent deflection is significantly different than, and non-analogous to, the use of AOTFs in a node architecture for adding/dropping wavelengths of a wavelength division multiplexed (WDM) light.

For example, Thompson relates to *deflecting* a light to tune a laser cavity, whereas

Gaudino relates to *filtering* a WDM light to thereby switch different wavelengths of the WDM light to different output ports. Moreover, the light in Thompson is laser light, whereas the light in Gaudino is WDM light.

Therefore, it is respectfully submitted that Gaudino and Thompson are non-analogous art.

On page 10 of the Final Office Action, the Examiner asserts that "since Guadino teaches cascading acousto-optic devices and Thompson teaches methods of controlling acousto-optical devices, it is clear that both references are related to the same field of endeavor".

However, as indicated above, Guadino discloses AOTFs cascaded together in a node architecture for adding/dropping wavelengths of a WDM light. Thompson, which is a U.S. Patent, is classified by the USTPO in classification 372, Coherent Light Generators. As an example, different types of lasers would be coherent light generators. Coherent Light Generators (e.g., lasers) as in Thompson are significantly different than node architectures for adding/dropping wavelengths of a WDM light as described above for Guadino.

Further, on page 10 of the Office Action, the Examiner broadly describes Gaudino as teaching "cascading acousto-optic devices" and Thompson as teaching "methods of controlling acousto-optical devices". It is respectfully submitted that such broad descriptions ignore the particular fields in which the inventions are intended. More specifically, as indicated above, Gaudino is directed to the particular field of a node architecture for adding/dropping wavelengths of a WDM light. By contrast, as indicated above, Thompson is directed to the particular field coherent light generators (e.g., lasers) and to the more particular field of tuning a laser cavity.

In addition, as indicated above, Thompson relates to *deflecting* a light to tune a laser cavity, whereas Gaudino relates to *filtering* a WDM light to thereby switch different wavelengths of the WDM light to different output ports. Moreover, as indicated above, the light in Thompson is laser light, whereas the light in Gaudino is WDM light.

For these reasons, it is respectfully submitted that the Examiner has too broadly described fields of endeavor of Gaudino and Thompson on page 10 of the Final Office Action.

In view of the above, it is respectfully reasserted that Gaudino and Thompson are non-analogous art.

Moreover, the Examiner asserts that column 6, lines 2-13, of Thompson, teach that it is well known in the art to configure cascaded AOTFs so that a phase of a beat generated by the RF signals applied to the first AOTF are different than a phase of a beat generated by the RF signals applied to the second AOTF. However, it is respectfully submitted that column 6, lines 2-

13 of Thompson, cited by the Examiner, relate to an acoustooptic deflector (AOD). For example, this portion of Thompson specifically indicates that it refers to an "AOD". As indicated on column 1, lines 43-58, of Thompson, an AOD is a specific type of acoustooptic device used to vary the deflection angle of a beam. By contrast, Gaudino relates to AOTFs, which are different devices from AODs. See, for example, column 1, line 43 through column 2, line 4, of Thompson, discussing differences between AODs and AOTFs. Therefore, it is respectfully submitted that the cited portion of Thompson should not be combined with Gaudino in the manner suggested by the Examiner.

In the first paragraph on page 9 of the Final Office Action, the Examiner asserts that "one skilled in the art would have been able to change the phase of the RF signals, as taught by Thompson, input to the acousto-optic devices taught by Gaudino. As such it is clear that through routine experimentation, one skilled in the art would have found settings for the phases of the RF signals input to the acousto-optic devices which yielded favorable results in the form of the beats generated by the input RF signals. Therefore, it is clear that one skilled in the art would have had the option of choosing the phase of the signals input to the acousto-optic devices, and thereby the phase of the beats produced by the input RF signals".

In response, it should be noted that, as indicated, for example, on page 5, lines 6-16, of the specification, with the conventional use of an AOTF, the output can have the undesirable effect of varying with time. Also, as indicated on page 5, lines 6-16, of the specification, various embodiments of the present invention are directed, for example, to providing stable output characteristics so that the output does not significantly vary with time.

The Examiner has not shown any reference which describes the problem of varying output over time with a conventional AOTF, and has not disclosed any reference suggesting that changing the phase of the beats of a multiple-AOTF configuration can provide stable output characteristics over time.

Therefore, it is respectfully submitted that the Examiner incorrectly asserts that, through routine experimentation, one skilled in the art would have found settings for the phases of the RF signals input to the acousto-optic devices which yielded favorable results in the form of the beats generated by the input RF signals.

* * *

Claims 2, 5, 37 and 41 relate to the differences in phase of beats as being equal to a value obtained by dividing 180° by the number of stages. Claims 2, 5, 37 and 41 are grouped together since these claims recite features relating to first and second optical filters or AOTFs,

and a difference in phase is obtained by dividing 180° by the number of stages.

The Examiner asserts that such a difference in phase of beats would be obvious over Gaudino in view of Thompson. More specifically, on page 9, lines 7-10, of the Final Office Action, the Examiner asserts that "It is clear that one skilled in the art could have selected a phase of the signal input to the acousto-optic devices that would have resulted in a difference in the phase of the beats being equal to a value obtained by division 180 by the number of stages."

However, it is respectfully submitted that neither reference relates to, or suggests, any type of relationship between the phase of the beats, the numbers of stages, and 180°. Moreover, it is respectfully submitted that neither reference indicates why such a relationship would be necessary. In addition, it is respectfully submitted that the Examiner has not indicated any portion of either reference which discloses or suggests any type of relationship between the phase of the beats, the number of stages and 180°, or provided any indication why a person of ordinary skill in the art would have made such a determination. For example, why does the Examiner believe that the use of "180°" would be clear to a person of ordinary skill in the art? Why not 45° or 100°?

Therefore, it is respectfully submitted that claims 2, 5, 37 and 41 are patentable over the combination of Gaudino and Thompson.

* * *

Claim 18 recites an apparatus comprising first, second and third AOTFs. The first AOTF filters an input light including a plurality of wavelengths to output first and second output lights, the first output light excluding a wavelength of the plurality of wavelengths selected in accordance with RF signals applied to the first AOTF for controlling filtering characteristics of the first AOTF, and the second output light including the selected wavelength. The second AOTF filters the first output light in accordance with RF signals applied to the second AOTF for controlling filtering characteristics of the second AOTF. The third AOTF filters the second output light in accordance with RF signals applied to the third AOTF for controlling filtering characteristics of the third AOTF.

As recited in claim 18, a phase of a beat generated by the RF signals applied to the first AOTF is different from a phase of a beat generated by the RF signals applied to the second AOTF and from a phase of a beat generated by the RF signals applied to the third AOTF.

Therefore, claim 18 relates to a specific configuration of first, second and third AOTFs, where a phase of a beat generated by the RF signals applied to the first AOTF is different from a phase of a beat generated by the RF signals applied to the second AOTF and from a phase of a

beat generated by the RF signals applied to the third AOTF.

See, for example, FIG. 14, where the first AOTF (AOTF1) outputs a first light (OUTPUT1) and a second light (OUTPUT2). The second AOTF (AOTF2) filters the first light, and the third AOTF (AOTF3) filters the second light. A phase of a beat generated by the RF signals applied to the first AOTF1 is different from a phase of a beat generated by the RF signals applied to the second AOTF2 and from a phase of a beat generated by the RF signals applied to the third AOTF3.

Claims 10, 12, 13, 14, 15, 18, 19, 20, 21, 22, 26, 28, 29, 30, 53, 55, 56, 57, 58, 59, 62, 64, 65, 66, 67, 68 and 72 are grouped together since these claims recite features relating to first, second and third optical filters or AOTFs, and different phases.

The Examiner asserts that such arrangements would be obvious over Gaudino in view of Thompson. The Examiner specifically refers to the second paragraph on page 79 of Gaudino as suggesting that greater than two AOTFs can be cascaded. However, from a review of Guadino, it is respectfully submitted that no portion of page 79, or any other portion of Gaudino, suggests that more than two AOTFs can be cascaded. For example, each configuration in Gaudino, such as those in FIGS. 1 and 5 of Gaudino, disclose the use of only two AOTFs.

On page 9 of the Final Office Action, the Examiner asserts that "Gaudino's experiment clearly showed that a signal could be recirculated repeatedly through the add/drop node at least 7 times before reaching the error threshold Q>6, thereby clearly suggesting that up to 7 of Gaudino's AOTFs could be cascaded before a signal input to those AOTFs reached the error threshold of Q>6." However, this disclosure in Gaudino is intended simply to show the cumulative error effect of a signal repeatedly passing through the two-AOTF configuration of Gaudino. For example, this disclosure shows the cumulative error effect when a signal passes through the two-AOTF configuration of Gaudino up to 7 times. In no way does this disclosure in Gaudino suggest that the two-AOTF configuration could be expanded to include more AOTFs.

It should be emphasized that no portion of Gaudino discloses or suggests how the two-AOTF configuration of Guadino would be modified to accompany additional AOTFs.

Further, it should be noted that, for example, claim 18 recites a specific arrangement of first, second and third AOTFs. More specifically, as indicated above, and as illustrated, for example, in FIG. 14, the first AOTF outputs a first light and a second light. The second AOTF filters the first light, and the third AOTF filters the second light. No portion of Gaudino discloses or suggests that second and third AOTFs filter different output lights of a first AOTF. Instead, even if it is assumed for the sake of argument that Gaudino discloses more than two AOTFs

being cascaded (although the Applicant does NOT agree that Gaudino discloses more than two AOTFs being cascaded), such cascading in Gaudino would likely be a serial cascade where the second AOTF filters output from the first AOTF, and the third AOTF filters output from the second AOTF. However, such an arrangement of AOTFs would be significantly different than that recited, for example, in claim 18.

Moreover, in accordance with above arguments, it is respectfully submitted that neither Gaudino or Thompson discloses or suggests the specific phases as recited in the claims.

* * *

Claim 25 recites first, second and third optical filters in a specific configuration. More specifically, the first optical filter filters an input light including a plurality of wavelengths to output first and second output lights. The first output light excludes a wavelength of the plurality of wavelengths selected in accordance with an RF signal applied to the first optical filter for controlling filtering characteristics of the first optical filter. The second output light includes the selected wavelength. The second optical filter filters the first output light. The third optical filter filters the second output light.

Moreover, as recited in claim 25, a phase controller controls phases of the RF signals applied to the first, second and third optical filters with respect to each other.

See, for example, FIG. 14.

Claims 25, 71, 74, 75, 76 and 77 are grouped together since these claims recite features relating to first, second and third optical filters, and phases controlled with respect to each other.

For the reasons indicated above, it is respectfully submitted that that neither Gaudino or Thompson, taken alone or in combination, disclose or suggest the specific configuration of first, second and third optical filters as recited in the claims.

Moreover, for the reasons indicated above, it is respectfully submitted that neither Gaudino or Thompson, taken alone or in combination, disclose or suggest the phase being controlled with respect to each other as recited in the claims, and especially with the specific configuration of the three optical filters as recited in the claims.

* * *

Claim 63 recites a specific configuration of first, second and third AOTFs. The RF signals controlling filtering characteristics of the second and third AOTFs each have a different phase than that of the RF signal controlling filtering characteristics of the first AOTF.

Moreover, as recited in claim 63, the RF signals for controlling filtering characteristics of

the second and third AOTFs have the SAME phase. See, for example, FIG. 14, where the phase for the second and third AOTFs is the same, and is different than the phase for the first AOTF.

Claims 11, 27, 54, 63 and 73 are grouped together since these claims recite features relating to first, second and third optical filters or AOTFs, where the "phase" for the first optical filter or AOTF is different than that for the second and third optical filters or AOTFs, and "phase" is equal for the second and third optical filters or AOTFs.

For the reasons indicated above, it is respectfully submitted that that neither Gaudino or Thompson, taken alone or in combination, disclose or suggest the specific configuration of first, second and third optical filters or AOTFs as recited in the claims. More specifically, neither Gaudino or Thompson explicitly discloses a three optical filter or AOTF configuration. Accordingly, neither reference discloses the phases for three optical filters or AOTFs. Moreover, there is nothing in either reference to suggest that the second and third optical filters in the specific three optical filter or AOTF configuration would have the same phase, and that these second and third optical filters or AOTFs would have a different phase than the first optical filter or AOTF in the specific configuration.

* * *

Claim 81 recites a specific configuration of five optical filters. More specifically, as recited in claim 81, a first optical filter filters an input light including a plurality of wavelengths to output first and second output lights. The first output light excludes a wavelength of the plurality of wavelengths selected in accordance with an RF signal applied to the first optical filter for controlling filtering characteristics of the first optical filter. The second output light includes the selected wavelength. The second optical filter filters the first output light. The third optical filter filters the second output light. The fourth optical filter filters the filtered, first output light from the second optical filter. The fifth optical filter filters the filtered, second output light from the third optical filter.

As recited in claim 81, a phase controller controls phases of the RF signals applied to the first, second, third, fourth and fifth optical filters with respect to each other.

See, for example, FIG. 33.

Claims 31, 32, 81, 84 are grouped together since these claims recite features relating to first, second, third, fourth and fifth optical filters or AOTFs, with phases controlled with respect to each other.

The Examiner asserts that such arrangements would be obvious over Gaudino in view of

Thompson. The Examiner specifically refers to the second paragraph on page 79 of Gaudino as suggesting that greater than two AOTFs can be cascaded. However, from a review of Guadino, it is respectfully submitted that no portion of page 79, or any other portion of Gaudino, suggests that more than two AOTFs can be cascaded. For example, each configuration in Gaudino, such as those in FIGS. 1 and 5 of Gaudino, disclose the use of only two AOTFs.

On page 9 of the Final Office Action, the Examiner asserts that "Gaudino's experiment clearly showed that a signal could be recirculated repeatedly through the add/drop node at least 7 times before reaching the error threshold Q>6, thereby clearly suggesting that up to 7 of Gaudino's AOTFs could be cascaded before a signal input to those AOTFs reached the error threshold of Q>6." However, this disclosure in Gaudino is intended simply to show the cumulative error effect of a signal repeatedly passing through the two-AOTF configuration of Gaudino. For example, this disclosure shows the cumulative error effect when a signal passes through the two-AOTF configuration of Gaudino up to 7 times. In no way does this disclosure in Gaudino suggest that the two-AOTF configuration could be expanded to include more AOTFs.

It should be emphasized that no portion of Gaudino discloses or suggests how the two-AOTF configuration of Guadino would be modified to accompany additional AOTFs.

Further, it should be noted that, for example, claim 81 recites a specific arrangement of first, second, third, forth and fifth optical filters. More specifically, as indicated above, and as illustrated, for example, in FIG. 33, the five AOTFs are arranged in a specific configuration so that (a) the first optical filters outputs first and second output lights, (b) the second optical filter filters the first output light, (c) the third optical filter filters the second output light, (d) the fourth optical filter filters the filtered, first output light from the second optical filter and (e) the fifth optical filter filters the filtered, second output light from the third optical filter.

No portion of Gaudino discloses or suggests that second and third AOTFs filter different output lights of a first AOTF, or that fourth and fifth AOTFs filter lights from the second and third AOTFs, respectively. Instead, even if it is assumed for the sake of argument that Gaudino discloses more than two AOTFs being cascaded (although the Applicant does NOT agree that Gaudino discloses more than two AOTFs being cascaded), such cascading in Gaudino would likely be a serial cascade where the second AOTF filters output from the first AOTF, the third AOTF filters output from the second AOTF, the fourth AOTF filters output from the third AOTF, and the fifth AOTF filters output from the fourth AOTF. However, such an arrangement of AOTFs would be significantly different than that recited, for example, in claim 81.

Moreover, in accordance with above arguments, it is respectfully submitted that neither

Gaudino or Thompson discloses or suggests a phase controller controls phases of the RF signals applied to the first, second, third, fourth and fifth optical filters with respect to each other.

* * *

Claims 82 and 85 recites a specific configuration of first, second, third, forth and fifth optical filters, where the phase of the first is different from the phase of the second, third, fourth and fifth optical filters. Accordingly, claims 82 and 85 are grouped together.

For the reasons indicated above, it is respectfully submitted that that neither Gaudino or Thompson, taken alone or in combination, disclose or suggest the specific configuration of first, second, third, fourth and fifth optical filters as recited in the claims.

Moreover, for the reasons indicated above, it is respectfully submitted that neither Gaudino or Thompson, taken alone or in combination, disclose or suggest that the phase of the first optical filter is different from the phase of the second, third, fourth and fifth optical filters.

* * *

Claim 83 recites first, second, third, fourth and fifth optical filters, where the phase for the first is different from the phase for the second, third, fourth and fifth; the phase for the second is equal to the phase for the third, and the phase for the fourth is equal to the phase for the fifth.

See, for example, FIG. 33.

For the reasons indicated above, it is respectfully submitted that that neither Gaudino or Thompson, taken alone or in combination, disclose or suggest the specific phases as recited in claim 83. More specifically, neither Gaudino or Thompson explicitly discloses a five optical filter configuration. Accordingly, neither reference discloses the phases for five optical filters.

Moreover, there is nothing in either reference to suggest that (a) the second and third optical filters in the specific five optical filter configuration would have the same phase, (b) the fourth and fifth optical filters in the specific five optical filter configuration would have the same phase, and (c) the phase for the first optical filter is different from the phase for the second, third, fourth and fifth optical filters.

* * *

In view of the above, it is respectfully submitted that the rejection is overcome.

REJECTION OF CLAIMS 16, 17, 23, 24, 33, 34, 60, 61, 69 AND 70 UNDER 35 USC 103 AS BEING UNPATENTABLE OVER GAUDINO IN VIEW OF THOMPSON AND CHEUNG, U.S. PATENT NO. 4,906,064

Rejected claims 16, 17, 23, 24, 33, 34, 60, 61, 69 and 70 relate to first, second and third optical filters or AOTFs being arranged in a specific configuration on a single substrate. Moreover, these claims recite the substrate having a "reflecting device" in a specific arrangement with the optical filters or AOTFs. Accordingly, claims 16, 17, 23, 24, 33, 34, 60, 61, 69 and 70 are grouped together.

Above comments for distinguishing over Gaudino and Thompson also apply here, as appropriate.

Cheung discloses a complex switching system which comprises a plurality of 2X2 switching elements and the use of an AOTF as a mode toggle control element. See, for example, FIG. 1; column 2, lines 52-55; and column 3, line 8, through column 4, line 5, of Cheung.

However, no portion of Cheung discloses or suggests that all the elements are formed on a single substrate.

Therefore, none of the references, taken individually or in combination, disclose or suggest first, second and third optical filters or AOTFs as being formed on a single substrate in a specific arrangement as recited in the rejected claims.

Moreover, none of the references, taken individually or in combination, disclose or suggest substrate having a "reflecting device" in a specific arrangement with the optical filters or AOTFs.

The Examiner notes that column 5, lines 11-15, of Cheung describe the use of integrated optics devices. However, it is respectfully submitted that this portion of Cheung is very general, and does not disclose or suggest the specific arrangement of optical filters and a reflecting device on a substrate, as recited in the claims.

* * *

In view of the above, it is respectfully submitted that the rejection is overcome.

9. CONCLUSION

In view of the above, it is respectfully submitted that the application is in condition for allowance, and a Notice of Allowance is earnestly solicited.

If any further fees are required in connection with the filing of this response, please charge such fees to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: October 7, 2003

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APPENDIX

The following is a copy of all pending claims in their current form:

1. (ORIGINAL) An apparatus comprising:

first and second optical filters cascaded together so that the second optical filter filters light output from the first optical filter, the first and second optical filters having filtering characteristics controlled in accordance RF signals applied thereto, wherein a phase of a beat generated by the RF signals applied to the first optical filter is different than a phase of a beat generated by the RF signals applied to the second optical filter.

2. (ORIGINAL) An apparatus as in claim 1, wherein the difference in phase of the beats generated by the RF signals applied to the first and second optical filters is equal to a value obtained by dividing 180° by the number of stages of cascaded optical filters.

3. (ORIGINAL) An apparatus as in claim 1, wherein the first and second optical filters are acousto-optical tunable filters.

4. (ORIGINAL) An apparatus comprising:

first and second acousto-optical tunable filters (AOTF) cascaded together so that the second AOTF filters light output from the first AOTF, the first and second AOTFs having filtering characteristics controlled in accordance with RF signals applied thereto, wherein a phase of a beat generated by the RF signals applied to the first AOTF is different than a phase of a beat generated by the RF signals applied to the second AOTF.

5. (ORIGINAL) An apparatus as in claim 4, wherein the difference in phase of the beats generated by the RF signals applied to the first and second AOTFs is equal to a value obtained by dividing 180° by the number of stages of cascaded AOTFs.

6. (ORIGINAL) An apparatus comprising:

a first optical filter selectively outputting a light having a wavelength corresponding to an RF signal controlling the first optical filter; and

a second optical filter receiving the light output from the first optical filter and selectively outputting a light having a wavelength corresponding to an RF signal controlling the second optical filter, wherein a phase of a beat generated by the RF signal controlling the first optical

filter is different than a phase of a beat generated by the RF signal controlling the second optical filter.

7. (ORIGINAL) An apparatus as in claim 6, wherein the first and second optical filters are acousto-optical tunable filters.

8. (ORIGINAL) An apparatus comprising:

a first optical filter receiving an input light including a plurality of wavelengths and filtering the input light to output a light having a respective wavelength of the plurality of wavelengths and selected in accordance with an RF signal controlling the first optical filter; and

a second optical filter filtering the light output from the first optical filter to output a light having a wavelength selected in accordance with an RF signal controlling the second optical filter, wherein a phase of a beat generated by the RF signal controlling the first optical filter is different than a phase of a beat generated by the RF signal controlling the second optical filter.

9. (ORIGINAL) An apparatus as in claim 8, wherein the first and second optical filters are acousto-optical tunable filters.

10. (ORIGINAL) An apparatus comprising:

a first optical filter filtering an input light including a plurality of wavelengths to output first and second output lights, the first output light excluding a wavelength of the plurality of wavelengths selected in accordance with RF signals applied to the first optical filter for controlling filtering characteristics of the first optical filter, and the second output light including said selected wavelength;

a second optical filter filtering the first output light in accordance with RF signals applied to the second optical filter for controlling filtering characteristics of the second optical filter; and

a third optical filter filtering the second output light in accordance with RF signals applied to the third optical filter for controlling filtering characteristics of the third optical filter, wherein a phase of a beat generated by the RF signals applied to the first optical filter is different than a phase of a beat generated by the RF signals applied to the second optical filter and a phase of a beat generated by the RF signals applied to the third optical filter.

11. (ORIGINAL) An apparatus as in claim 10, wherein the beats generated by the

RF signals applied to the second and third optical filters have the same phase.

12. (ORIGINAL) An apparatus as in claim 10, wherein the second optical filter filters the first output light with filtering characteristics which reject said selected wavelength, in accordance with the RF signals applied to the second optical filter.

13. (ORIGINAL) An apparatus as in claim 10, wherein the third optical filter filters the second output light with filtering characteristics which pass said selected wavelength, in accordance with the RF signals applied to the third optical filter.

14. (ORIGINAL) An apparatus as in claim 12, wherein the third optical filter filters the second output light with filtering characteristics which pass said selected wavelength, in accordance with the RF signals applied to the third optical filter.

15. (ORIGINAL) An apparatus as in claim 10, wherein

the first output light from the first optical filter excludes at least two wavelengths of the plurality of wavelengths and which are selected in accordance with the RF signals applied to the first optical filter, and

the second output light from the first optical filter includes said selected at least two wavelengths.

16. (ORIGINAL) An apparatus as in claim 10, wherein

the first, second and third optical filters are acousto- optical tunable filters formed on a single substrate,

the substrate has at least one reflecting device thereon, and

the first, second and third optical filters, and the at least one reflecting device, are arranged on the substrate so that

the first output light reflects from the first optical filter to the second optical filter to be filtered by the second optical filter, and

the second output light reflects from the first optical filter to the third optical filter to be filtered by the third optical filter.

17. (ORIGINAL) An apparatus as in claim 16, wherein the first, second and third

optical filters, and the at least one reflecting device, are arranged on the substrate relative to each other so that

the first output light reflecting from the first optical filter to the second optical filter does not reflect back to the first optical filter, and

the second output light reflecting from the first optical filter to the third optical filter does not reflect back to the first optical filter.

18. (ORIGINAL) An apparatus comprising:

a first acousto-optical tunable filter (AOTF) filtering an input light including a plurality of wavelengths to output first and second output lights, the first output light excluding a wavelength of the plurality of wavelengths selected in accordance with RF signals applied to the first AOTF for controlling filtering characteristics of the first AOTF, and the second output light including said selected wavelength;

a second AOTF filtering the first output light in accordance with RF signals applied to the second AOTF for controlling filtering characteristics of the second AOTF; and

a third AOTF filtering the second output light in accordance with RF signals applied to the third AOTF for controlling filtering characteristics of the third AOTF, wherein a phase of a beat generated by the RF signals applied to the first AOTF is different from a phase of a beat generated by the RF signals applied to the second AOTF and from a phase of a beat generated by the RF signals applied to the third AOTF.

19. (ORIGINAL) An apparatus as in claim 18, wherein the second AOTF filters the first output light with filtering characteristics which reject said selected wavelength, in accordance with the RF signals applied to the second AOTF.

20. (ORIGINAL) An apparatus as in claim 18, wherein the third AOTF filters the second output light with filtering characteristics which pass said selected wavelength, in accordance with the RF signals applied to the third AOTF.

21. (ORIGINAL) An apparatus as in claim 19, wherein the third AOTF filters the second output light with filtering characteristics which pass said selected wavelength, in accordance with the RF signals applied to the third AOTF.

22. (ORIGINAL) An apparatus as in claim 18, wherein

the first output light from the first AOTF excludes at least two wavelengths of the plurality of wavelengths and which are selected in accordance with the RF signals applied to the first AOTF, and

the second output light from the first AOTF includes said selected at least two wavelengths.

23. (ORIGINAL) An apparatus as in claim 18, wherein

the first, second and third AOTFs are formed on a single substrate,

the substrate has at least one reflecting device thereon, and

the first, second and third AOTFs, and the at least one reflecting device, are arranged on the substrate so that

the first output light reflects from the first AOTF to the second AOTF to be filtered by the second AOTF, and

the second output light reflects from the first AOTF to the third AOTF to be filtered by the third AOTF.

24. (ORIGINAL) An apparatus as in claim 23, wherein the first, second and third AOTFs, and the at least one reflecting device, are arranged on the substrate relative to each other so that

the first output light reflecting from the first AOTF to the second AOTF does not reflect back to the first AOTF, and

the second output light reflecting from the first AOTF to the third AOTF does not reflect back to the first AOTF.

25. (ORIGINAL) An apparatus comprising:

a first optical filter filtering an input light including a plurality of wavelengths to output first and second output lights, the first output light excluding a wavelength of the plurality of wavelengths selected in accordance with an RF signal applied to the first optical filter for controlling filtering characteristics of the first optical filter, and the second output light including said selected wavelength;

a second optical filter filtering the first output light in accordance with an RF signal applied to the second optical filter for controlling filtering characteristics of the second optical

filter;

a third optical filter filtering the second output light in accordance with an RF signal applied to the third optical filter for controlling filtering characteristics of the third optical filter; and

a phase controller controlling phases of the RF signals applied to the first, second and third optical filters with respect to each other.

26. (ORIGINAL) An apparatus as in claim 25, wherein the phase controller controls the phases so that a phase of a beat generated by the RF signal applied to the first optical filter is different from a phase of a beat generated by the RF signal applied to the second optical filter and from a phase of a beat generated by the RF signal applied to the third optical filter.

27. (ORIGINAL) An apparatus as in claim 26, wherein the phase controller controls the phases of the RF signals applied to the second and third optical filters to be equal.

28. (ORIGINAL) An apparatus as in claim 26, wherein the second optical filter filters the first output light with filtering characteristics which reject said selected wavelength, in accordance with the RF signal applied to the second optical filter.

29. (ORIGINAL) An apparatus as in claim 26, wherein the third optical filter filters the second output light with filtering characteristics which pass said selected wavelength, in accordance with the RF signal applied to the third optical filter.

30. (ORIGINAL) An apparatus as in claim 28, wherein the third optical filter filters the second output light with filtering characteristics which pass said selected wavelength, in accordance with the RF signal applied to the third optical filter.

31. (ORIGINAL) An apparatus as in claim 26, wherein:

the second optical filter filters the first output light with filtering characteristics which reject said selected wavelength, in accordance with the RF signal applied to the second optical filter,

the third optical filter filters the second output light with filtering characteristics which pass said selected wavelength, in accordance with the RF signal applied to the third optical filter, and

the apparatus further comprises

a fourth optical filter filtering the filtered, first output light from the second optical

filter with filtering characteristics which reject said selected wavelength, in accordance with an RF signal applied to the fourth optical filter for controlling filtering characteristics of the fourth optical filter, and

a fifth optical filter filtering the filtered, second output light from the third optical filter with filtering characteristics which pass said selected wavelength, in accordance with an RF signal applied to the fifth optical filter for controlling filtering characteristics of the fifth optical filter.

32. (ORIGINAL) An apparatus as in claim 31, wherein the phase controller controls phases of the RF signals applied to the first, second, third, fourth and fifth optical filters with respect to each other.

33. (ORIGINAL) An apparatus as in claim 25, wherein

the first, second and third optical filters are formed on a single substrate,

the substrate has at least one reflecting device thereon, and

the first, second and third optical filters, and the at least one reflecting device, are arranged on the substrate so that

the first output light reflects from the first optical filter to the second optical filter to be filtered by the second optical filter, and

the second output light reflects from the first optical filter to the third optical filter to be filtered by the third optical filter.

34. (ORIGINAL) An apparatus as in claim 33, wherein the first, second and third optical filters, and the at least one reflecting device, are arranged on the substrate relative to each other so that

the first output light reflecting from the first optical filter to the second optical filter does not reflect back to the first optical filter, and

the second output light reflecting from the first optical filter to the third optical filter does not reflect back to the first optical filter.

35. (ORIGINAL) An apparatus comprising:

first and second optical filters cascaded together so that the second optical filter filters light output from the first optical filter, the first and second optical filters having filtering

characteristics controlled in accordance with first and second RF signals, respectively, wherein the first RF signal has a different phase than the second RF signal.

36. (ORIGINAL) An apparatus as in claim 35, wherein a phase of a beat generated by the first RF signal is different than a phase of a beat generated by the second RF signal.

37. (ORIGINAL) An apparatus as in claim 36, wherein the difference in phase of the beats generated by the first and second RF signals is equal to a value obtained by dividing 180° by the number of stages of cascaded optical filters.

38. (ORIGINAL) An apparatus as in claim 35, wherein the first and second RF signals are at the same frequency.

39. (ORIGINAL) An apparatus comprising:

first and second acousto-optical tunable filters (AOTF) cascaded together so that the second AOTF filters light output from the first AOTF, the first and second AOTFs having filtering characteristics controlled in accordance with first and second RF signals, respectively, wherein the first RF signal has a different phase than the second RF signal.

40. (ORIGINAL) An apparatus as in claim 39, wherein a phase of a beat generated by the first RF signal is different than a phase of a beat generated by the second RF signal.

41. (ORIGINAL) An apparatus as in claim 40, wherein the difference in phase of the beats generated by the first and second RF signals is equal to a value obtained by dividing 180° by the number of stages of cascaded AOTFs.

42. (ORIGINAL) An apparatus as in claim 39, wherein the first and second RF signals are at the same frequency.

43. (ORIGINAL) An apparatus comprising:

a first optical filter selectively outputting a light having a wavelength corresponding to an RF signal controlling the first optical filter; and

a second optical filter receiving the light output from the first optical filter and selectively

outputting a light having a wavelength corresponding to an RF signal controlling the second optical filter, wherein a phase of the RF signal for controlling the first optical filter is different than a phase of the RF signal for controlling the second optical filter.

44. (ORIGINAL) An apparatus as in claim 43, wherein the first and second optical filters are acousto-optical tunable filters.

45. (ORIGINAL) An apparatus as in claim 43, wherein a phase of a beat generated by the RF signal controlling the first optical filter is different than a phase of a beat generated by the RF signal controlling the second optical filter.

46. (ORIGINAL) An apparatus as in claim 43, further comprising:

a phase shifter causing the phase of the RF signal controlling the first optical filter to be different than a phase of the RF signal controlling the second optical filter.

47. (ORIGINAL) An apparatus as in claim 43, wherein the RF signal controlling the first optical filter is at the same frequency as the RF signal controlling the second optical filter.

48. (ORIGINAL) An apparatus comprising:

a first optical filter receiving an input light including a plurality of wavelengths and filtering the input light to output a light having a respective wavelength of the plurality of wavelengths and selected in accordance with an RF signal controlling the first optical filter; and

a second optical filter filtering the light output from the first optical filter to output a light having a wavelength selected in accordance with an RF signal controlling the second optical filter, wherein a phase of the RF signal for controlling the first optical filter is different than a phase of the RF signal for controlling the second optical filter.

49. (ORIGINAL) An apparatus as in claim 48, wherein the first and second optical filters are acousto-optical tunable filters.

50. (ORIGINAL) An apparatus as in claim 48, wherein a phase of a beat generated by the RF signal controlling the first optical filter is different than a phase of a beat generated by the RF signal controlling the second optical filter.

51. (ORIGINAL) An apparatus as in claim 48, further comprising:

a phase shifter causing the phase of the RF signal controlling the first optical filter to be different than a phase of the RF signal controlling the second optical filter.

52. (ORIGINAL) An apparatus as in claim 48, wherein the RF signal controlling the first optical filter is at the same frequency as the RF signal controlling the second optical filter.

53. (ORIGINAL) An apparatus comprising:

a first optical filter filtering an input light including a plurality of wavelengths to output first and second output lights, the first output light excluding a wavelength of the plurality of wavelengths selected in accordance with an RF signal controlling filtering characteristics of the first optical filter, and the second output light including said selected wavelength;

a second optical filter filtering the first output light in accordance with an RF signal controlling filtering characteristics of the second optical filter; and

a third optical filter filtering the second output light in accordance with an RF signal controlling filtering characteristics of the third optical filter, wherein the RF signals controlling filtering characteristics of the second and third optical filters each have a different phase than that of the RF signal controlling filtering characteristics of the first optical filter.

54. (ORIGINAL) An apparatus as in claim 53, wherein the RF signals for controlling filtering characteristics of the second and third optical filters have the same phase.

55. (ORIGINAL) An apparatus as in claim 53, wherein the second optical filter filters the first output light with filtering characteristics which reject said selected wavelength, in accordance with the RF signal controlling the second optical filter.

56. (ORIGINAL) An apparatus as in claim 53, wherein the third optical filter filters the second output light with filtering characteristics which pass said selected wavelength, in accordance with the RF signal controlling the third optical filter.

57. (ORIGINAL) An apparatus as in claim 55, wherein the third optical filter filters the second output light with filtering characteristics which pass said selected wavelength, in

accordance with the RF signal controlling the third optical filter.

58. (ORIGINAL) An apparatus as in claim 53, wherein the RF signals controlling the first, second and third optical filters are at the same frequency.

59. (ORIGINAL) An apparatus as in claim 53, wherein the first, second and third optical filters are acousto-optical tunable filters.

60. (ORIGINAL) An apparatus as in claim 53, wherein

the first, second and third optical filters are formed on a single substrate,

the substrate has at least one reflecting device thereon, and

the first, second and third optical filters, and the at least one reflecting device, are arranged on the substrate so that

the first output light reflects from the first optical filter to the second optical filter to be filtered by the second optical filter, and

the second output light reflects from the first optical filter to the third optical filter to be filtered by the third optical filter.

61. (ORIGINAL) An apparatus as in claim 60, wherein the first, second and third optical filters, and the at least one reflecting device, are arranged on the substrate relative to each other so that

the first output light reflecting from the first optical filter to the second optical filter does not reflect back to the first optical filter, and

the second output light reflecting from the first optical filter to the third optical filter does not reflect back to the first optical filter.

62. (ORIGINAL) An apparatus comprising:

a first acousto-optical tunable filter (AOTF) filtering an input light including a plurality of wavelengths to output first and second output lights, the first output light excluding a wavelength of the plurality of wavelengths selected in accordance with an RF signal controlling filtering characteristics of the first AOTF, and the second output light including said selected wavelength;

a second AOTF filtering the first output light in accordance with an RF signal controlling filtering characteristics of the second AOTF; and

a third AOTF filtering the second output light in accordance with an RF signal controlling filtering characteristics of the third AOTF, wherein the RF signals controlling filtering characteristics of the second and third AOTFs each have a different phase than that of the RF signal controlling filtering characteristics of the first AOTF.

63. (ORIGINAL) An apparatus as in claim 62, wherein the RF signals for controlling filtering characteristics of the second and third AOTFs have the same phase.

64. (ORIGINAL) An apparatus as in claim 62, wherein a phase of a beat generated by the RF signals controlling filtering characteristics of the second and third AOTFs is different than a phase of a beat generated by the RF signal controlling filtering characteristics of the first AOTF.

65. (ORIGINAL) An apparatus as in claim 62, wherein the RF signals controlling filtering characteristics of the first, second and third AOTFs are at the same frequency.

66. (ORIGINAL) An apparatus as in claim 62, wherein the second AOTF filters the first output light with filtering characteristics which reject said selected wavelength, in accordance with the RF signal controlling the second AOTF.

67. (ORIGINAL) An apparatus as in claim 62, wherein the third AOTF filters the second output light with filtering characteristics which pass said selected wavelength, in accordance with the RF signal controlling the third AOTF.

68. (ORIGINAL) An apparatus as in claim 66, wherein the third AOTF filters the second output light with filtering characteristics which pass said selected wavelength, in accordance with the RF signal controlling the third AOTF.

69. (ORIGINAL) An apparatus as in claim 62, wherein

the first, second and third AOTFs are formed on a single substrate,

the substrate has at least one reflecting device thereon, and

the first, second and third AOTFs, and the at least one reflecting device, are arranged on the substrate so that

the first output light reflects from the first AOTF to the second AOTF to be filtered by the second AOTF, and

the second output light reflects from the first AOTF to the third AOTF to be filtered by the third AOTF.

70. (ORIGINAL) An apparatus as in claim 69, wherein the first, second and third AOTFs, and the at least one reflecting device, are arranged on the substrate relative to each other so that

the first output light reflecting from the first AOTF to the second AOTF does not reflect back to the first AOTF, and

the second output light reflecting from the first AOTF to the third AOTF does not reflect back to the first AOTF.

71. (ORIGINAL) An apparatus comprising:

a first optical filter filtering an input light including a plurality of wavelengths to output first and second output lights, the first output light excluding a wavelength of the plurality of wavelengths selected in accordance with an RF signal controlling filtering characteristics of the first optical filter, and the second output light including said selected wavelength;

a second optical filter filtering the first output light in accordance with an RF signal controlling filtering characteristics of the second optical filter;

a third optical filter filtering the second output light in accordance with an RF signal controlling filtering characteristics of the third optical filter; and

a phase controller controlling phases of the RF signals controlling filtering characteristics of the first, second and third optical filters with respect to each other.

72. (ORIGINAL) An apparatus as in claim 71, wherein the phase controller controls the phases so that the phases of RF signals controlling filtering characteristics of the first and second optical filters are different than the phase of the RF signal controlling filtering characteristics of the first optical filter.

73. (ORIGINAL) An apparatus as in claim 72, wherein the phase controller controls the phases of the RF signals for controlling filtering characteristics of the second and third optical filters to be equal.

74. (ORIGINAL) An apparatus as in claim 71, wherein the RF signals for controlling filtering characteristics of the first, second and third optical filters are at the same frequency.

75. (ORIGINAL) An apparatus as in claim 71, wherein the second optical filter filters the first output light with filtering characteristics which reject said selected wavelength, in accordance with the RF signal controlling the second optical filter.

76. (ORIGINAL) An apparatus as in claim 71, wherein the third optical filter filters the second output light with filtering characteristics which pass said selected wavelength, in accordance with the RF signal controlling the third optical filter.

77. (ORIGINAL) An apparatus as in claim 75, wherein the third optical filter filters the second output light with filtering characteristics which pass said selected wavelength, in accordance with the RF signal controlling the third optical filter.

78. (ORIGINAL) An apparatus comprising:

a first optical filter receiving an input light including a plurality of wavelengths and filtering the input light to output a light having at least two wavelengths of the plurality of wavelengths and selected in accordance with RF signals controlling the first optical filter, the RF signals including at least two RF signals corresponding, respectively, to the selected at least two wavelengths and having frequencies suitable for causing the first optical filter to select the corresponding wavelengths; and

a second optical filter filtering the light output from the first optical filter to output a light having wavelengths selected in accordance with RF signals controlling the second optical filter, the RF signals controlling the second optical filter including at least one RF signal having a frequency which is the same as, but having a phase which is different than, that of an RF signal controlling the first optical filter.

79. (ORIGINAL) An apparatus as in claim 78, wherein the first and second optical filters are acousto-optical tunable filters.

80. (ORIGINAL) An apparatus comprising:

a plurality of acousto-optical tunable filters (AOTF) cascaded together, each AOTF generating a surface acoustic wave in an optical waveguide in accordance with an RF signal applied to the AOTF to selectively output a light having a wavelength corresponding to the RF signal, wherein a phase of a beat generated by the RF signal applied to one of the plurality of AOTFs is different from a phase of a beat generated by the RF signal applied to a different AOTF of the plurality of AOTFs.

81. (ORIGINAL) An apparatus comprising:

a first optical filter filtering an input light including a plurality of wavelengths to output first and second output lights, the first output light excluding a wavelength of the plurality of wavelengths selected in accordance with an RF signal applied to the first optical filter for controlling filtering characteristics of the first optical filter, and the second output light including said selected wavelength;

a second optical filter filtering the first output light with filtering characteristics which reject said selected wavelength in accordance with an RF signal applied to the second optical filter for controlling filtering characteristics of the second optical filter;

a third optical filter filtering the second output light with filtering characteristics which pass said selected wavelength in accordance with an RF signal applied to the third optical filter for controlling filtering characteristics of the third optical filter;

a fourth optical filter filtering the filtered, first output light from the second optical filter with filtering characteristics which reject said selected wavelength in accordance with an RF signal applied to the fourth optical filter for controlling filtering characteristics of the fourth optical filter;

a fifth optical filter filtering the filtered, second output light from the third optical filter with filtering characteristics which pass said selected wavelength in accordance with an RF signal applied to the fifth optical filter for controlling filtering characteristics of the fifth optical filter; and

a phase controller controlling phases of the RF signals applied to the first, second, third, fourth and fifth optical filters with respect to each other.

82. (ORIGINAL) An apparatus as in claim 81, wherein the phase controller controls the phases so that

the phase of the RF signal applied to the first optical filter is different from the phases of the RF signals applied to the second, third, fourth and fifth optical filters.

83. (ORIGINAL) An apparatus as in claim 82, wherein the phases of the RF signals applied to the second and third optical filters are equal, and the phases of the RF signals applied to the fourth and fifth optical filters are equal.

84. (ORIGINAL) An apparatus as in claim 81, wherein the first, second, third, fourth and fifth optical filters are acousto-optical tunable filters.

85. (ORIGINAL) An apparatus as in claim 82, wherein the first, second, third, fourth and fifth optical filters are acousto-optical tunable filters.

86. (ORIGINAL) A method comprising:

cascading first and second optical filters together so that the second optical filter filters light output from the first optical filter, the first and second optical filters having filtering characteristics controlled in accordance RF signals applied thereto; and

causing a phase of the RF signal applied to the first optical filter to be different than a phase of the RF signal applied to the second optical filter.

87. (ORIGINAL) A method as in claim 86, wherein a phase of a beat generated by the RF signal applied to the first optical filter is different than a phase of a beat generated by the RF signal applied to the second optical filter.

88. (ORIGINAL) A method comprising:

cascading first and second optical filters together so that the second optical filter filters light output from the first optical filter, the first and second optical filters having filtering characteristics controlled in accordance RF signals applied thereto; and

causing a phase of a beat generated by the RF signals applied to the first optical filter to be different than a phase of a beat generated by the RF signals applied to the second optical filter.

89. (ORIGINAL) An optical communication system comprising:

a transmission line;

a transmitter transmitting a wavelength division multiplexed (WDM) signal including a plurality of channels through the transmission line;

a receiver receiving the transmitted WDM signal through the transmission line; and

an optical filtering apparatus filtering the WDM signal as the WDM signal travels through the transmission line from the transmitter to the receiver to selectively filter at least one channel from the WDM signal, the optical filtering apparatus including

first and second acousto-optical tunable filters (AOTF) cascaded together so that first AOTF filters the WDM signal and produces a corresponding filtered output light, and the second AOTF filters the filtered output light from the first AOTF, the first and second AOTFs having filtering characteristics controlled in accordance with first and second RF signals, respectively, wherein the first RF signal has a different phase than the second RF signal.